



Europäisches Patentamt  
European Patent Office  
Office européen des brevets



⑪ Publication number:

0 513 841 A2

⑫

## EUROPEAN PATENT APPLICATION

⑬ Application number: 92108358.0

⑮ Int. Cl. 5: H04B 7/26, H04M 1/72,  
H04Q 7/04

⑯ Date of filing: 18.05.92

⑰ Priority: 17.05.91 JP 113457/91

⑰ Inventor: Nagashima, Noriaki, c/o NEC  
Corporation  
7-1, Shiba 5-chome, Minato-ku  
Tokyo(JP)

⑲ Date of publication of application:  
19.11.92 Bulletin 92/47

⑰ Representative: Vossius & Partner  
Siebertstrasse 4 P.O. Box 86 07 67  
W-8000 München 86(DE)

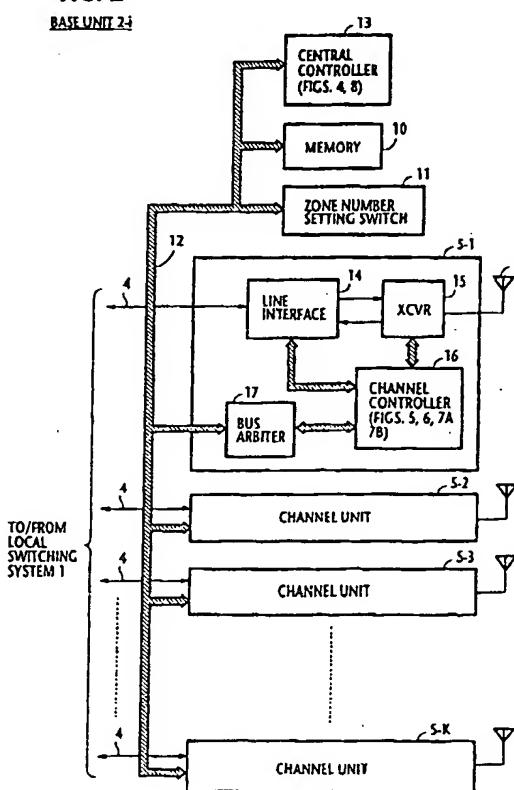
⑳ Designated Contracting States:  
DE FR GB NL SE

㉑ Applicant: NEC CORPORATION  
7-1, Shiba 5-chome Minato-ku  
Tokyo 108-01(JP)

### ㉒ Dynamic channel assignment cordless telecommunication network.

㉓ In telecommunication network for serving cordless units located in a microcells. Radio speech channels, which are allotted to the network, are divided into channel groups such that no intermodulation products occur among the channels of each group. The network comprises a plurality of base units located respectively in the service zones. Each base unit establishes two-way speech channels with those of the cordless units which are located in the same zone as the base unit and generates priority values of the channel groups as representations of usages of the groups through a statistical process. According to the priority values, one of the channel groups is assigned to the base unit.

FIG. 2



EP 0 513 841 A2

The present invention relates generally to switched telephone networks for serving an area which is divided into relatively small service zones in which cordless telephones are located, and more specifically to a channel assignment technique for use with such cordless telephone networks.

With cellular mobile telephony, automobile stations are usually located at such greater distances apart that signals transmitted from mobile stations are not strong enough to interfere with other stations to produce intermodulation products. No difficulty arises in assigning speech channels to the mobile stations. However, with microcellular systems which are currently employed in business environments, the service area is divided into small zones, or microcells with a radius of as small as several tens of meters and cordless telephones are usually located at short distances apart. In some instances, the distance between adjacent cordless stations may be as short as 1 meter. In addition, the size and shape of each of the microcells differ from one cell to another and a great number of base units must be provided. One problem associated with such microcellular systems is that due to the high density of cordless units intermodulation products are often generated between adjacent units and seriously affect the operation of the system.

It is therefore an object of the present invention to provide a channel assignment technique for dynamically assigning channels to each of the divided microcells of a cordless telecommunication network.

According to the present invention, there is provided a telecommunication network for serving cordless units located in a plurality of service zones. Radio speech channels, which are allotted to the network, are organized into a plurality of channel groups such that no intermodulation products occur among the channels of each group. The network comprises a plurality of base units located respectively in the service zones. Each base unit establishes two-way speech channels with those of the cordless units which are located in the same zone as the base unit and generates priority values of the channel groups as representations of usages of the groups through a statistical process. According to the priority values, one of the channel groups is assigned to the base unit.

Preferably, a priority table is provided having entries corresponding respectively to the channel groups for storing priority values of the channel groups respectively in the corresponding entries. The field intensity of each channel of all groups is measured and the stored priority value of the channel group (or currently assigned to the base unit) to which the radio channel belongs is increased if the measured field intensity is higher than a specified

value and decreased if the measured intensity is lower than the specified value. A maximum value of the priority values stored in the priority table is detected and one of the channel groups having the maximum value is assigned to the base unit instead of the channel group currently assigned to the base unit.

Preferably, the detected maximum value is compared with the priority value of the currently assigned channel group and the channel group having the maximum value is reassigned to the base unit if the maximum value is greater than the previous value by more than a predetermined amount.

According to a specific aspect of this invention, the network includes a channel status table having entries corresponding respectively to the channels of all the groups for storing busy/idle status bits respectively in the corresponding entries indicating the busy/idle states of the channels, and a priority table having entries corresponding respectively to the channel groups for storing priority values of the channel groups respectively in the corresponding entries. Each base unit receives a call request to or from the cordless units located in the same zone as the base unit, and updates the busy/idle status bits of the channels of the channel group which is currently assigned to the base unit according to the presence and absence of the call request. All busy/idle status bits are sequentially retrieved from the channel status table, and each channel is classified as representing a first possible state of the channel if the retrieved status bit indicates a busy state. The field intensity of each channel is measured if the retrieved status bit of the channel indicates an idle state, and this channel is classified as representing a second possible state if the measured intensity of the channel is lower than a specified value or a third possible state (a busy state of a channel of a group not currently assigned to the base unit) if the measured intensity is higher than the specified value. The base unit determines whether all channels are classified as simultaneously representing a mixture of the first, second and third possible states. If this is the case, the stored priority value of the channel group which is currently assigned to the base unit is increased if each channel is classified as representing the third possible state, and that stored value is decreased if each channel is classified as representing the first or second possible state.

The present invention will be described in further detail with reference to the accompanying drawings, in which:

Fig. 1 is a block diagram of a switched cordless telephone network in which the dynamic channel assignment of the present invention is implemented;

Fig. 2 is a block diagram of a base unit of Fig. 2;

Fig. 3 shows details of the common memory of Fig. 2;

Fig. 4 is a flowchart showing steps of initialization routine performed by the central controller of a base unit;

Figs. 5 and 6 are flowcharts respectively showing steps of connection setup and clearing routines performed by the controller of a channel unit;

Figs. 7A and 7B are flowcharts showing steps of a priority update routine performed by the controller of a channel unit; and

Fig. 8 is a flowchart showing steps of a change-of-priority routine performed by the central controller.

Fig. 1 is a block diagram of a private switched cordless telephone network in which the dynamic channel assignment scheme of the present invention is shown incorporated. In Fig. 1, the system comprises a local switching system 1 such as PBX (private branch exchange) connected through exchange lines to a public switched network, not shown. Connected by extension lines 4 to the local switching system 1 are base units 2-1 ~ 2-N of identical construction which are located in strategic points of respective microcells, or service zones 3-1 through 3-N. Each base unit comprises FDM (frequency division multiplex) channel units 5-1 through 5-K each being capable of establishing a two-way control channel or a two-way speech channel. For a typical system, speech channels are provided as channels #1 through #49 and a control channel as channel #50. The extension lines from the local switching system 1 are terminated respectively to these channel units. Cordless units 6 are located in each service zone 3. During an idle state, each cordless unit is constantly monitoring the control channel, ready to receive control signals from any of the channel units of the zone in which it is located, to tune to one of the speech channels with frequency division multiplex with other channel units when a call is originated or received. The number of channel units provided for each service zone is dependent

Speech channels #1 through #49 are organized into several groups so that no intermodulation products occur between the speech channels of the same group as well as between any of the speech channels and the control channel. According to the present invention, the channel groups are given priority values which are dynamically altered in a manner to be described, and each service zone is assigned a channel group whose priority value is higher than a previous one.

As shown in Fig. 2, each base unit 2-i comprises a memory 10 and a zone number setting

switch 11 which are coupled by way of a common bus 12 to channel units 5-1 through 5-K. The zone number setting switch 11 of each service zone has a dial which is a manually set to indicate a channel group number initially assigned to the service zone. A central controller 13 provides initialization procedure to be described. Each channel unit 5 includes a line interface 14 coupled through the associated extension line 4 to the local switching system 1. A radio-frequency transceiver 15 is coupled to the line interface 13 and to a channel controller 16 and is normally tuned to the common control channel to receive call processing signals through interface 13 or from cordless units 6 through antenna 18 for setting up a two-way speech channel under control of the channel controller. Channel controller 16 cooperates with memory 10 and zone number setting switch 11 by way of a bus arbiter 17 to dynamically assign a speech channel in a manner as will be described. Bus arbiter 17 provides arbitration among channel units 5 when more than one channel unit attempts to obtain the right to use the common channel 13.

As shown in Fig. 3, memory 10 is partitioned into several areas for defining a channel group table 20, a priority group table 21, a channel status table 22, a field intensity table 23 and a group assignment register 24. Channel group table 20 defines a map establishing relationships between channel group identifiers and speech channel numbers. For example, channels #1, #2, #4, #8, #13, #21 and #35 are organized into group #1 and among which no intermodulation occurs. Priority group table 21 defines relationships between channel groups and priority values. As will be described, each group is initially given a priority value of 0.5, which is updated dynamically depending on the usage of all channels of the system. Channel status table 22 establishes relationships between channels of the system and their busy/idle status, and field intensity table 23 defines relationships between all channels of the system and their field intensity levels represented by one of codes "0", "1" and "2". As will be described in detail later, field intensity table 23 is updated by first checking each channel entry of channel status table 22 to see if it is busy or idle. If it is busy, code "1" is stored into the field intensity column of the corresponding channel entry of field intensity table 23 without performing a field intensity test. If channel status table 22 shows that a channel is idle, the field intensity of this channel is checked to see if it is higher or lower than a prescribed level. If it is higher than the prescribed level, the channel under test is recognized as a channel of other group and is currently in a busy state. In such instances, code "2" is stored into the field intensity table 23. Otherwise, a code "0" is stored into field intensity table

23. Group assignment register 24 is used to store an assigned channel group number. When a call request is originated from a cordless unit or an incoming call is received, control channel unit 5 accesses this assignment table to identify which group is assigned to which zone.

Central controller 13 is programmed to perform an initialization routine as illustrated in Fig. 4.

During an initial system startup, the initialization routine begins with step 30 which checks the zone number setting switch 11 to look up the zone number initially assigned to the own service zone and stores it into the group assignment register 24 as an initial channel-group assignment procedure. Control goes to step 31 to set all priority values of channel priority table 21 to an initial value of, say, 0.5. Exit then is to step 32 to initialize channel status table 22 by setting all of its status bits to "0" (i.e., idle state).

The channel controller 16 of each channel unit is programmed to process call processing signals over the control channel as well as to perform channel assignment procedures. With the system initialization procedure being complete, the channel controller 16 of one of the channel units may respond to a call request from a cordless unit and invokes a channel status update routine (Fig. 5). This routine starts with step 40 to access the group assignment register 24 to read out each of the initially assigned channel groups and then the channel group table 20 is accessed to read all the channel numbers of the initially assigned group. Control proceeds to step 41 to use the retrieved channel numbers to access the channel status table 22 as address pointers. An idle channel is selected from the assigned group and the status bit of the selected channel is changed to "1". In a manner well known in the art, controller 16 causes transceiver 15 to be tuned to the selected speech channel to allow the calling cordless unit to enter a talking mode. The controller 16 of the talking channel eventually responds to an end-of-call signal from the cordless unit by executing step 42 (Fig. 6) in which it accesses channel status table 22 to reset the status of the speech channel to "0".

Figs. 7A and 7B are flowcharts illustrating a priority update routine. This update routine is invoked at periodic intervals and begins with step 50 which directs the setting of the address pointer of channel status table 22 to channel entry #1. Exit then is to step 51 to read the channel status table 22. Control proceeds to decision step 52 to check to see if the status bit of the accessed entry of table 22 is "1". If this is the case, control branches at step 52 to step 53 to set a code "1" into the corresponding channel entry of the field intensity table 23 as an indication that the channel being examined is one that belongs to the same group

and is currently in a busy state. Control exits to step 54 to check to see if the end of channel entries is reached in channel status table 22. If the answer is negative, control branches to step 55 to advance the address pointer to the next and returns to step 51 to repeat the process. In this way, the busy states of the channel status table 22 are transferred to corresponding channel entries of the field intensity table 23.

If the status bit of the examined channel entry of status table 22 is "0" (i.e., idle state), control branches at step 52 to step 56 to measure the field intensity of the speech channel of the entry being examined. Control advances to step 57 to determine if the measured field intensity is higher than a prescribed level. If the answer is affirmative, control branches to step 58 to set a code "2" into the corresponding channel entry of the field intensity table 23 as an indication that the channel being examined is one that belongs to another base unit. Otherwise, control branches to step 59 to set a code "0" into the corresponding channel entry of field intensity table 23 as an indication that the channel being examined is one that belongs to the same group and is currently in an idle state. Following the execution of either step 58 or 59, control returns to step 54. In this way, all channel entries of channel status table 22 are eventually set either to "0", "1" or "2", and when this occurs, control branches at step 54 to step 60.

In step 60 (Fig. 7B), all entries of the field intensity table 23 are sequentially retrieved for checking to see if they comprise a mixture of codes "0", "1" and "2". If the answer is negative, control branches at step 61 to the end of this routine, and if it is affirmative, control branches at step 61 to step 62 to set the address pointer of the field intensity table 23 to entry #1 to read out this tube (step 63) from the starting location to examine each speech channel. Exit then is to decision step 64 to check to see if the status bit of the examined channel is code "2" or otherwise. If a code "2" is detected, control branches at step 64 to step 65 to calculate the following formula,

$$P = (K \times P)/(K + 1) \quad (1)$$

where, P is a priority value and K a constant which determines an incremental/decremental value of the priority value with respect to the previous value, and is typically a K-value of 128 is adopted. Control proceeds to step 67 to set the calculated priority value into the corresponding channel-group entry of the priority table 21 rewriting a previous priority value.

If the status bit read out of table 23 is code "0" or "1", control branches at step 64 to step 66 to

calculate the following formula,

$$P = (K \times P + 1)/(K + 1) \quad (2)$$

and proceeds to step 67 to set the calculated priority value into the corresponding channel-group entry of the priority table 21. The priority value P obtained by Equations (1) and (2) varies in the range between 0 and 1. Note that each result of Equation (1) is greater than the previous value and the incremental value of the result becomes smaller as the priority value P approaches unity and becomes greater as it approaches zero, while each result of Equation (2) is smaller than the previous and the decremental value of the result becomes greater as the priority value P approaches unity and becomes smaller as it approaches zero.

After executing an end-of-entries checking step in decision block 68 following block 67, the address pointer is advanced to the next (step 69) if all entries have not yet been checked, and control returns to step 63 to read the next channel entry of the field intensity table 23. In this way, the previous priority value of each channel group is rewritten with a calculated value subsequently derived from the next channel entry of the channel group, and each entry of the priority table 21 is filled with a value obtained from the last calculation. If the decision in step 68 becomes affirmative, control terminates the priority update routine.

Since the calculated priority value reflects the previous priority value of the same channel group and the calculation is repeated on all channels of the same group to rewrite the previous value, the final priority value is a result of a statistical process. Further, the priority value is varied depending on whether the field intensity level of idle channels is higher or lower than a specified value, the priority of each channel group represents a statistical result of the usage of the channels of the group over an extended period of time. Therefore, channel assignment is dynamically performed without causing interference between adjacent service zones and without being adversely affected by a time-varying traffic load.

In addition, since the priority updating steps 62 through 68 are skipped when all status bits of the field intensity table 23 are other than a mixture of codes "0", "1" and "2", the priority values of all channel groups tend to converge to a certain value during a light traffic period, effectively reducing the range of priority values which are derived during a heavy traffic period. This feature produces a further stabilizing effect on the dynamic channel assignment scheme.

The central controller 13 of each base unit is further programmed to execute a change-of-priority routine shown in Fig. 8 at periodic intervals. This

routine begins with step 70 to make a search through all entries of priority table 21 for a maximum value. Exit then is to decision step 71 to compare the maximum priority value with the current priority value of a channel group which is assigned to the base unit. If the maximum value is greater than the current value by more than a predetermined value, typically 0.1, control branches at step 71 to step 72 to read all channel status bits of the currently assigned channel group from the channel status table 22 and goes to decision step 73 to determine if all status bits are zero (i.e.; all channels of the currently assigned group are idle). If the answer is affirmative, controller 16 of each service zone 3-i branches at step 73 to step 74 to store the channel group number of the maximum priority value into the corresponding zone entry of the group assignment register 24, thus rewriting a previously stored channel group number. If all speech channels of the currently assigned group are busy, the decision is negative in step 73 and control branches to step 75 to wait a certain period of time and returns to step 70 to repeat the process until all status bits of table 22 becomes zero. If step 71 makes a negative decision, control branches to the end of the routine, leaving the current channel group number in the group assignment register 24 unchanged.

Since the channel group register 24 is updated only when the maximum priority value is greater than the current value of a base unit by more than a specified amount, it is possible for the base unit to avoid changing channel groups when the channels of the current group are temporarily rendered all busy. This feature ensures channel assignment stability even when two or more channel groups have slightly differing priority values.

#### Claims

1. A telecommunication network for serving cordless units located in a plurality of service zones, said network having radio speech channels which are organized into a plurality of channel groups such that no intermodulation products occur among the channels of each group, said network comprising a plurality of base units located respectively in said service zones, each of said base units comprising:
  - means for establishing two-way speech channels with those of the cordless units which are located in the same zone as the base unit; and
  - means for generating priority values of said channel groups as representations of usages of said groups through a statistical process and assigning one of said channel groups to the base unit according to said priority val-

ues.

2. A telecommunication network as claimed in claim 1, wherein said priority value generating means comprises:

a priority table having entries corresponding respectively to said channel groups, said priority table storing priority values of said channel groups respectively in said corresponding entries;

means for measuring field intensity of each of said radio channels and increasing the stored priority value of the channel group to which the radio channel belongs if the measured field intensity is higher than a specified value and decreasing said stored priority value of the channel group if the measured field intensity is lower than said specified value; and

means for detecting a maximum value of said priority values stored in said priority table and reassigning one of said channel groups having said maximum value to the base unit instead of the channel group currently assigned to the base unit.

3. A telecommunication network as claimed in claim 1, wherein said priority value generating means comprises:

a priority table having entries corresponding respectively to said channel groups, said priority table storing priority values of said channel groups respectively in said corresponding entries;

means for measuring field intensity of each of said radio channels and increasing the stored priority value of the channel group to which the radio channel belongs if the measured field intensity is higher than a specified value and decreasing said stored priority value of the channel group if the measured field intensity is lower than said specified value;

means for detecting a maximum value of said priority values stored in said priority table; and

means for comparing the detected maximum value with the priority value of the channel group which is currently assigned to the base unit and reassigning one of said channel groups having said maximum value instead of the current channel group if the maximum value is greater than said previous value by more than a predetermined amount.

4. A telecommunication network as claimed in claim 1, wherein said priority value generating means comprises:

a priority table having entries corresponding respectively to said channel groups, said

priority table storing priority values of said channel groups respectively in said corresponding entries;

means for (a) measuring field intensity of each of said radio channels, classifying the measured field intensity of each channel as representing one of first, second and third possible states of the channel, (b) determining whether all the measured field intensities simultaneously represent a mixture of said first, second and third possible states of said channels, (c) increasing the stored priority value of the channel group which is currently assigned to the base unit if the measured field intensity of each channel is classified, as representing the third possible state and if all the measured field intensities are determined as representing said mixture of possible states, and (d) decreasing said stored priority value of the currently assigned channel group if the measured field intensity of each channel is classified as representing the first or second possible state and if all the measured field intensities are determined as representing said mixture of possible states, said first, second and third possible states representing respectively an idle state of each channel, a busy state of each channel of the channel group currently assigned to the base unit, and a busy state of each channel of a channel group other than said assigned channel group; and

means for detecting a maximum value of said priority values stored in said priority table and reassigning one of said channel groups having said maximum value to the base unit instead of the channel group currently assigned to the base unit.

5. A telecommunication network as claimed in claim 1, wherein said priority value generating means comprises:

a priority table having entries corresponding respectively to said channel groups, said priority table storing priority values of said channel groups respectively in said corresponding entries;

means for (a) measuring field intensity of each of said radio channels, classifying the measured field intensity of each channel as representing one of first, second and third possible states of the channel, (b) determining whether all the measured field intensities simultaneously represent a mixture of said first, second and third possible states of said channels, (c) increasing the stored priority value of the channel group which is currently assigned to the base unit if the measured field intensity of each channel is classified as representing

the third possible state and if all the measured field intensities are determined as representing said mixture of possible states, and (d) decreasing said stored priority value of the currently assigned channel group if the measured field intensity of each channel is classified as representing the first or second possible state and if all the measured field intensities are determined as representing said mixture of possible states, said first, second and third possible states representing respectively an idle state of each channel, a busy state of each channel of the channel group currently assigned to the base unit, and a busy state of each channel of a channel group other than said assigned channel group; and

means for detecting a maximum value of said priority values stored in said priority table; and

means for comparing the detected maximum value with the priority value of the channel group which is currently assigned to the base unit and reassigning one of said channel groups having said maximum value instead of the current channel group if the maximum value is greater than said previous value by more than a predetermined amount.

6. A telecommunication network as claimed in claim 1, wherein said priority value generating means comprises:

a channel status table having entries corresponding respectively to the channels of all of said groups, said channel status table storing busy/idle status bits respectively in said corresponding entries indicating the busy/idle states of said channels;

means for receiving a call request to or from said cordless units located in the same zone as the base unit, and updating the busy/idle status bits of the channels of the channel group which is currently assigned to the base unit according to presence and absence of said call request;

a priority table having entries corresponding respectively to said channel groups, said priority table storing priority values of said channel groups respectively in said corresponding entries;

means for (a) sequentially retrieving all the busy idle status bits from said channel status table, (b) classifying each channel of all said groups as representing a first possible state of the channel if the retrieved status bit indicates a busy state of the channel, (c) measuring field intensity of each channel of all said groups if the retrieved status bit indicates an idle busy state of the channel and classifying the chan-

nel as representing a second possible state of the channel if the measured field intensity of the channel is lower than a specified value or a third possible state of the channel if the measured field intensity is higher than the specified value, (d) determining whether all the channels are classified as simultaneously representing a mixture of said first, second and third possible states, (e) increasing the stored priority value of the channel group which is currently assigned to the base unit if each channel of all said groups is classified as representing the third possible state and if all channels of said groups are determined as representing said mixture of all possible states, and (f) decreasing said stored priority value of the currently assigned channel group if each channel of all said groups is classified as representing the first or second possible state and if all channels of said groups are determined as representing said mixture of all possible states, said third possible state representing a busy state of each channel of a channel group which is not currently assigned to the base unit; and

means for detecting a maximum value of said priority values stored in said priority table and reassigning one of said channel groups having said maximum value to the base unit instead of the channel group currently assigned to the base unit.

7. A telecommunication network as claimed in claim 6, wherein said maximum value detecting and reassigning means comprises means for retrieving the busy/idle status bits of the channels of the group currently assigned to the base unit and reassigning said one channel group to the base unit if the retrieved status bits simultaneously indicate all idle states of the channels.

8. A telecommunication network as claimed in claim 1, wherein said priority value generating means comprises:

a channel status table having entries corresponding respectively to the channels of all said groups, said channel status table storing busy/idle status bits respectively in said corresponding entries indicating the busy/idle states of said channels;

means for receiving a call request to or from said cordless units located in the same zone as the base unit, and updating the busy/idle status bits of the channels of the channel group which is currently assigned to the base unit according to presence and absence of said call request;

a priority table having entries corresponding respectively to said channel groups, said priority table storing priority values of said channel groups respectively in said corresponding entries;

means for (a) sequentially retrieving all the busy/idle status bits from said channel status table, (b) classifying each channel of all said groups as representing a first possible state of the channel if the retrieved status bit indicates a busy state of the channel, (c) measuring field intensity of each channel of all said groups if the retrieved status bit indicates an idle busy state of the channel and classifying the channel as representing a second possible state of the channel if the measured field intensity of the channel is lower than a specified value or a third possible state of the channel if the measured field intensity is higher than the specified value, (d) determining whether all the channels are classified as simultaneously representing a mixture of said first, second and third possible states, (e) increasing the stored priority value of the channel group which is currently assigned to the base unit if each channel of all said groups is classified as representing the third possible state and if all channels of said groups are determined as representing said mixture of all possible states, and (f) decreasing said stored priority value of the currently assigned channel group if each channel of all said groups is classified as representing the first or second possible state and if all channels of said groups are determined as representing said mixture of all possible states, said third possible state representing a busy state of each channel of a channel group which is not currently assigned to the base unit;

means for detecting a maximum value of said priority values stored in said priority table; and

means for comparing the detected maximum value with the priority value of the channel group which is currently assigned to the base unit and reassigning one of said channel groups having said maximum value instead of the current channel group if the maximum value is greater than said previous value by more than a predetermined amount.

- A telecommunication network as claimed in claim 8, wherein said maximum value detecting and reassigning means comprises means for retrieving the busy/idle status bit of the channels of the group currently assigned to the base unit and reassigning said one channel group to the base unit if the retrieved status

bits simultaneously indicate all idle states of the channels.

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 1235 1240 1245 1250 1255 1260 1265 1270 1275 1280 1285 1290 1295 1300 1305 1310 1315 1320 1325 1330 1335 1340 1345 1350 1355 1360 1365 1370 1375 1380 1385 1390 1395 1400 1405 1410 1415 1420 1425 1430 1435 1440 1445 1450 1455 1460 1465 1470 1475 1480 1485 1490 1495 1500 1505 1510 1515 1520 1525 1530 1535 1540 1545 1550 1555 1560 1565 1570 1575 1580 1585 1590 1595 1600 1605 1610 1615 1620 1625 1630 1635 1640 1645 1650 1655 1660 1665 1670 1675 1680 1685 1690 1695 1700 1705 1710 1715 1720 1725 1730 1735 1740 1745 1750 1755 1760 1765 1770 1775 1780 1785 1790 1795 1800 1805 1810 1815 1820 1825 1830 1835 1840 1845 1850 1855 1860 1865 1870 1875 1880 1885 1890 1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080 2085 2090 2095 2100 2105 2110 2115 2120 2125 2130 2135 2140 2145 2150 2155 2160 2165 2170 2175 2180 2185 2190 2195 2200 2205 2210 2215 2220 2225 2230 2235 2240 2245 2250 2255 2260 2265 2270 2275 2280 2285 2290 2295 2300 2305 2310 2315 2320 2325 2330 2335 2340 2345 2350 2355 2360 2365 2370 2375 2380 2385 2390 2395 2400 2405 2410 2415 2420 2425 2430 2435 2440 2445 2450 2455 2460 2465 2470 2475 2480 2485 2490 2495 2500 2505 2510 2515 2520 2525 2530 2535 2540 2545 2550 2555 2560 2565 2570 2575 2580 2585 2590 2595 2600 2605 2610 2615 2620 2625 2630 2635 2640 2645 2650 2655 2660 2665 2670 2675 2680 2685 2690 2695 2700 2705 2710 2715 2720 2725 2730 2735 2740 2745 2750 2755 2760 2765 2770 2775 2780 2785 2790 2795 2800 2805 2810 2815 2820 2825 2830 2835 2840 2845 2850 2855 2860 2865 2870 2875 2880 2885 2890 2895 2900 2905 2910 2915 2920 2925 2930 2935 2940 2945 2950 2955 2960 2965 2970 2975 2980 2985 2990 2995 3000 3005 3010 3015 3020 3025 3030 3035 3040 3045 3050 3055 3060 3065 3070 3075 3080 3085 3090 3095 3100 3105 3110 3115 3120 3125 3130 3135 3140 3145 3150 3155 3160 3165 3170 3175 3180 3185 3190 3195 3200 3205 3210 3215 3220 3225 3230 3235 3240 3245 3250 3255 3260 3265 3270 3275 3280 3285 3290 3295 3300 3305 3310 3315 3320 3325 3330 3335 3340 3345 3350 3355 3360 3365 3370 3375 3380 3385 3390 3395 3400 3405 3410 3415 3420 3425 3430 3435 3440 3445 3450 3455 3460 3465 3470 3475 3480 3485 3490 3495 3500 3505 3510 3515 3520 3525 3530 3535 3540 3545 3550 3555 3560 3565 3570 3575 3580 3585 3590 3595 3600 3605 3610 3615 3620 3625 3630 3635 3640 3645 3650 3655 3660 3665 3670 3675 3680 3685 3690 3695 3700 3705 3710 3715 3720 3725 3730 3735 3740 3745 3750 3755 3760 3765 3770 3775 3780 3785 3790 3795 3800 3805 3810 3815 3820 3825 3830 3835 3840 3845 3850 3855 3860 3865 3870 3875 3880 3885 3890 3895 3900 3905 3910 3915 3920 3925 3930 3935 3940 3945 3950 3955 3960 3965 3970 3975 3980 3985 3990 3995 4000 4005 4010 4015 4020 4025 4030 4035 4040 4045 4050 4055 4060 4065 4070 4075 4080 4085 4090 4095 4100 4105 4110 4115 4120 4125 4130 4135 4140 4145 4150 4155 4160 4165 4170 4175 4180 4185 4190 4195 4200 4205 4210 4215 4220 4225 4230 4235 4240 4245 4250 4255 4260 4265 4270 4275 4280 4285 4290 4295 4300 4305 4310 4315 4320 4325 4330 4335 4340 4345 4350 4355 4360 4365 4370 4375 4380 4385 4390 4395 4400 4405 4410 4415 4420 4425 4430 4435 4440 4445 4450 4455 4460 4465 4470 4475 4480 4485 4490 4495 4500 4505 4510 4515 4520 4525 4530 4535 4540 4545 4550 4555 4560 4565 4570 4575 4580 4585 4590 4595 4600 4605 4610 4615 4620 4625 4630 4635 4640 4645 4650 4655 4660 4665 4670 4675 4680 4685 4690 4695 4700 4705 4710 4715 4720 4725 4730 4735 4740 4745 4750 4755 4760 4765 4770 4775 4780 4785 4790 4795 4800 4805 4810 4815 4820 4825 4830 4835 4840 4845 4850 4855 4860 4865 4870 4875 4880 4885 4890 4895 4900 4905 4910 4915 4920 4925 4930 4935 4940 4945 4950 4955 4960 4965 4970 4975 4980 4985 4990 4995 5000 5005 5010 5015 5020 5025 5030 5035 5040 5045 5050 5055 5060 5065 5070 5075 5080 5085 5090 5095 5100 5105 5110 5115 5120 5125 5130 5135 5140 5145 5150 5155 5160 5165 5170 5175 5180 5185 5190 5195 5200 5205 5210 5215 5220 5225 5230 5235 5240 5245 5250 5255 5260 5265 5270 5275 5280 5285 5290 5295 5300 5305 5310 5315 5320 5325 5330 5335 5340 5345 5350 5355 5360 5365 5370 5375 5380 5385 5390 5395 5400 5405 5410 5415 5420 5425 5430 5435 5440 5445 5450 5455 5460 5465 5470 5475 5480 5485 5490 5495 5500 5505 5510 5515 5520 5525 5530 5535 5540 5545 5550 5555 5560 5565 5570 5575 5580 5585 5590 5595 5600 5605 5610 5615 5620 5625 5630 5635 5640 5645 5650 5655 5660 5665 5670 5675 5680 5685 5690 5695 5700 5705 5710 5715 5720 5725 5730 5735 5740 5745 5750 5755 5760 5765 5770 5775 5780 5785 5790 5795 5800 5805 5810 5815 5820 5825 5830 5835 5840 5845 5850 5855 5860 5865 5870 5875 5880 5885 5890 5895 5900 5905 5910 5915 5920 5925 5930 5935 5940 5945 5950 5955 5960 5965 5970 5975 5980 5985 5990 5995 6000 6005 6010 6015 6020 6025 6030 6035 6040 6045 6050 6055 6060 6065 6070 6075 6080 6085 6090 6095 6100 6105 6110 6115 6120 6125 6130 6135 6140 6145 6150 6155 6160 6165 6170 6175 6180 6185 6190 6195 6200 6205 6210 6215 6220 6225 6230 6235 6240 6245 6250 6255 6260 6265 6270 6275 6280 6285 6290 6295 6300 6305 6310 6315 6320 6325 6330 6335 6340 6345 6350 6355 6360 6365 6370 6375 6380 6385 6390 6395 6400 6405 6410 6415 6420 6425 6430 6435 6440 6445 6450 6455 6460 6465 6470 6475 6480 6485 6490 6495 6500 6505 6510 6515 6520 6525 6530 6535 6540 6545 6550 6555 6560 6565 6570 6575 6580 6585 6590 6595 6600 6605 6610 6615 6620 6625 6630 6635 6640 6645 6650 6655 6660 6665 6670 6675 6680 6685 6690 6695 6700 6705 6710 6715 6720 6725 6730 6735 6740 6745 6750 6755 6760 6765 6770 6775 6780 6785 6790 6795 6800 6805 6810 6815 6820 6825 6830 6835 6840 6845 6850 6855 6860 6865 6870 6875 6880 6885 6890 6895 6900 6905 6910 6915 6920 6925 6930 6935 6940 6945 6950 6955 6960 6965 6970 6975 6980 6985 6990 6995 7000 7005 7010 7015 7020 7025 7030 7035 7040 7045 7050 7055 7060 7065 7070 7075 7080 7085 7090 7095 7100 7105 7110 7115 7120 7125 7130 7135 7140 7145 7150 7155 7160 7165 7170 7175 7180 7185 7190 7195 7200 7205 7210 7215 7220 7225 7230 7235 7240 7245 7250 7255 7260 7265 7270 7275 7280 7285 7290 7295 7300 7305 7310 7315 7320 7325 7330 7335 7340 7345 7350 7355 7360 7365 7370 7375 7380 7385 7390 7395 7400 7405 7410 7415 7420 7425 7430 7435 7440 7445 7450 7455 7460 7465 7470 7475 7480 7485 7490 7495 7500 7505 7510 7515 7520 7525 7530 7535 7540 7545 7550 7555 7560 7565 7570 7575 7580 7585 7590 7595 7600 7605 7610 7615 7620 7625 7630 7635 7640 7645 7650 7655 7660 7665 7670 7675 7680 7685 7690 7695 7700 7705 7710 7715 7720 7725 7730 7735 7740 7745 7750 7755 7760 7765 7770 7775 7780 7785 7790 7795 7800 7805 7810 7815 7820 7825 7830 7835 7840 7845 7850 7855 7860 7865 7870 7875 7880 7885 7890 7895 7900 7905 7910 7915 7920 7925 7930 7935 7940 7945 7950 7955 7960 7965 7970 7975 7980 7985 7990 7995 8000 8005 8010 8015 8020 8025 8030 8035 8040 8045 8050 8055 8060 8065 8070 8075 8080 8085 8090 8095 8100 8105 8110 8115 8120 8125 8130 8135 8140 8145 8150 8155 8160 8165 8170 8175 8180 8185 8190 8195 8200 8205 8210 8215 8220 8225 8230 8235 8240 8245 8250 8255 8260 8265 8270 8275 8280 8285 8290 8295 8300 8305 8310 8315 8320 8325 8330 8335 8340 8345 8350 8355 8360 8365 8370 8375 8380 8385 8390 8395 8400 8405 8410 8415 8420 8425 8430 8435 8440 8445 8450 8455 8460 8465 8470 8475 8480 8485 8490 8495 8500 8505 8510 8515 8520 8525 8530 8535 8540 8545 8550 8555 8560 8565 8570 8575 8580 8585 8590 8595 8600 8605 8610 8615 8620 8625 8630 8635 8640 8645 8650 8655 8660 8665 8670 8675 8680 8685 8690 8695 8700 8705 8710 8715 8720 8725 8730 8735 8740 8745 8750 8755 8760 8765 8770 8775 8780 8785 8790 8795 8800 8805 8810 8815 8820 8825 8830 8835 8840 8845 8850 8855 8860 8865 8870 8875 8880 8885 8890 8895 8900 8905 8910 8915 8920 8925 8930 8935 8940 8945 8950 8955 8960 8965 8970 8975 8980 8985 8990 8995 9000 9005 9010 9015 9020 9025 9030 9035 9040 9045 9050 9055 9060 9065 9070 9075 9080 9085 9090 9095 9100 9105 9110 9115 9120 9125 9130 9135 9140 9145 9150 9155 9160 9165 9170 9175 9180 9185 9190 9195 9200 9205 9210 9215 9220 9225 9230 9235 9240 9245 9250 9255 9260 9265 9270 9275 9280 9285 9290 9295 9300 9305 9310 9315 9320 9325 9330 9335 9340 9345 9350 9355 9360 9365 9370 9375 9380 9385 9390 9395 9400 9405 9410 9415 9420 9425 9430 9435 9440 9445 9450 9455 9460 9465 9470 9475 9480 9485 9490 9495 9500 9505 9510 9515 9520 9525 9530 9535 9540 9545 9550 9555 9560 9565 9570 9575 9580 9585 9590 9595 9600 9605 9610 9615 9620 9625 9630 9635 9640 9645 9650 9655 9660 9665 9670 9675 9680 9685 9690 9695 9700 9705 9710 9715 9720 9725 9730 9735 9740 9745 9750 9755 9760 9765 9770 9775 9780 9785 9790 9795 9800 9805 9810 9815 9820 9825 9830 9835 9840 9845 9850 9855 9860 9865 9870 9875 9880 9885 9890 9895 9900 9905 9910 9915 9920 9925 9930 9935 9940 9945 9950 9955 9960 9965 9970 9975 9980 9985 9990 9995 9999 10000 10005 10010 10015 10020 10025 10030 10035 10040 10045 10050 10055 10060 10065 10070 10075 10080 10085 10090 10095 10099 10100 10101 10102 10103 10104 10105 10106 10107 10108 10109 10110 10111 10112 10113 10114 10115 10116 10117 10118 10119 10120 10121 10122 10123 10124 10125 10126 10127 10128 10129 10130 10131 10132 10133 10134 10135 10136 10137 10138 10139 10140 10141 10142 10143 10144 10145 10146 10147 10148 10149 10150 10151 10152 10153 10154 10155 10156 10157 10158 10159 10160 10161 10162 10163 10164 10165 10166 10167 10168 10169 10170 10171 10172 10173 10174 10175 10176 10177 10178 10179 10180 10181 10182 10183 10184 10185 10186 10187 10188 10189 10190 10191 10192 10193 10194 10195 10196 10197 10198 10199 10200 10201 10202 10203 10204 10205 10206 10207 10208 10209 10210 10211 10212 10213 10214 1

of the channel group which is currently assigned to the base unit and reassigning said one of said channel groups if the maximum value is greater than said previous value by more than a predetermined amount. 5

14. A method as claimed in claim 12 or 13, wherein the step (a<sub>2</sub>) comprises the steps of: 10

A<sub>1</sub>) classifying the measured field intensity of each channel as representing one of first, second and third possible states of the channel, 15

A<sub>2</sub>) determining whether all the measured field intensities simultaneously represent a mixture of said first, second and third possible states of said channels, said first, second and third possible states representing respectively an idle state of each channel, a busy state of each channel of the channel group currently assigned to the base unit, and a busy state of each channel of a channel group other than said assigned channel group; and 20

A<sub>3</sub>) if all the measured field intensities are determined by the step (A<sub>2</sub>) as representing said mixture of possible states, increasing the stored priority value of the channel group which is currently assigned to the base unit if the measured field intensity of each channel is classified by the step (A<sub>1</sub>) as representing the third possible state and decreasing said stored priority value of the currently assigned channel group if the measured field intensity of each channel is classified by the step (A<sub>1</sub>) as representing the first or second possible state. 25

15. A method as claimed in claim 11, 12, or 13, wherein each of the base units further comprises a channel status table having entries corresponding respectively to the channels of all said groups, said channel status table storing busy/idle status bits respectively in said corresponding entries indicating the busy/idle states of said channels, wherein the step (a) comprises the steps of: 30

a<sub>1</sub>) receiving a call request to or from said cordless units located in the same zone as the base unit, and updating the busy/idle status bits of the channels of the channel group which is currently assigned to the base unit according to presence and absence of said call request; 35

a<sub>2</sub>) sequentially retrieving all the busy/idle status bits from said channel status table; 40

a<sub>3</sub>) classifying each channel of all said groups as representing a first possible state of the channel if the retrieved status bit 45

50

55

indicates a busy state of the channel; a<sub>4</sub>) measuring field intensity of each channel of all said groups if the retrieved status bit indicates an idle busy state of the channel and classifying the channel as representing a second possible state of the channel if the measured field intensity of the channel is lower than a specified value or a third possible state of the channel if the measured field intensity is higher than the specified value, said third possible state representing a busy state of each channel of a channel group which is not currently assigned to the base unit; 55

(a<sub>5</sub>) determining whether all the channels of said groups are classified as simultaneously representing a mixture of said first, second and third possible states; and 60

(a<sub>6</sub>) if all channels of said groups are determined by the step (a<sub>5</sub>) as representing said mixture of all possible states, increasing the stored priority value of the channel group which is currently assigned to the base unit if each channel of all said groups is classified by the step (a<sub>3</sub>) as representing the third possible state, and decreasing said stored priority value of the currently assigned channel group if each channel of all said groups is classified by the step (a<sub>3</sub>) as representing the first or second possible state. 65

16. A method as claimed in claim 15, wherein the step (b) comprises the steps of retrieving the busy/idle status bits of the channels of the group currently assigned to the base unit and reassigning said one channel group to the base unit if the retrieved status bits simultaneously indicate all idle states of the channels. 70

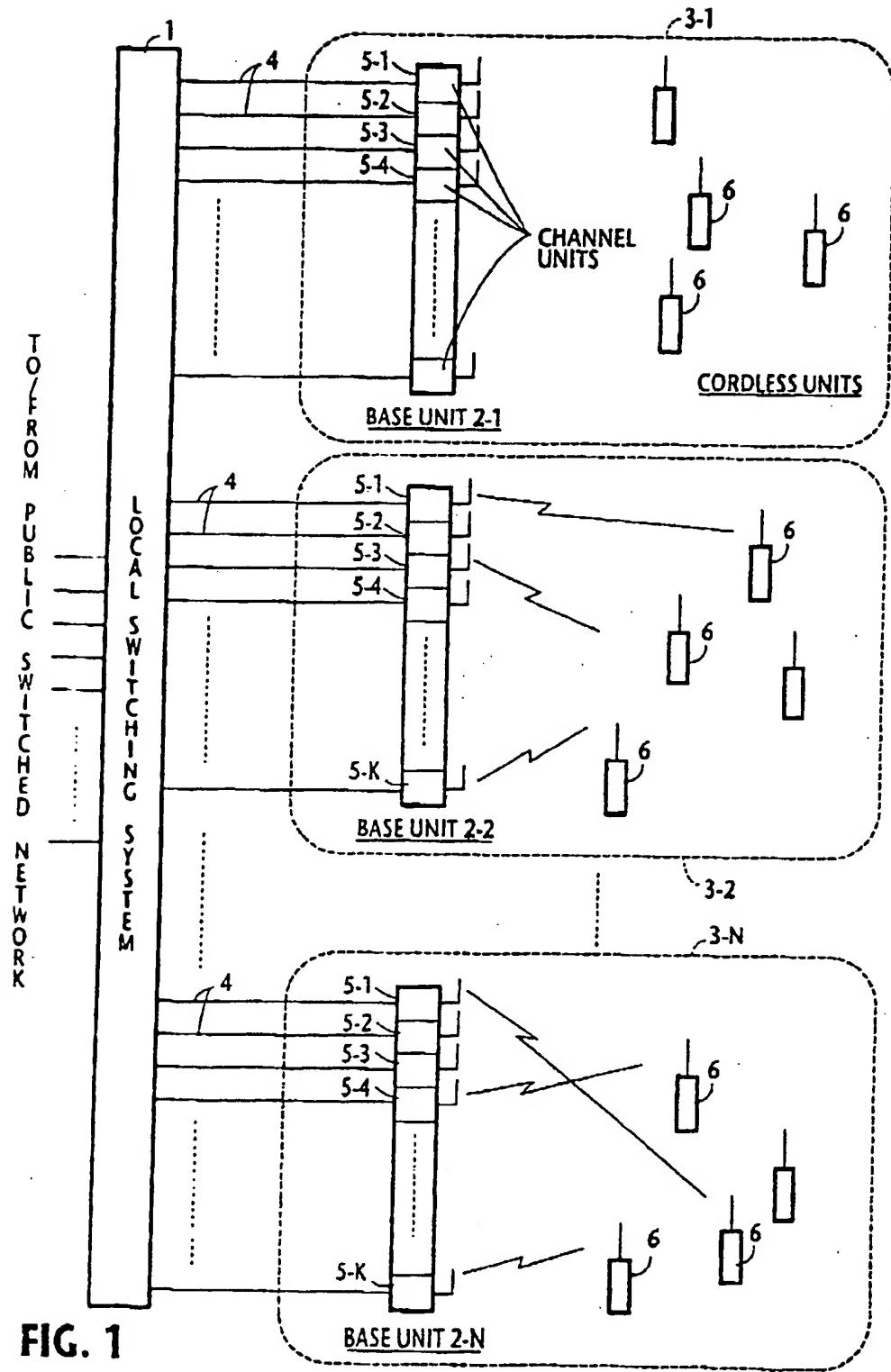
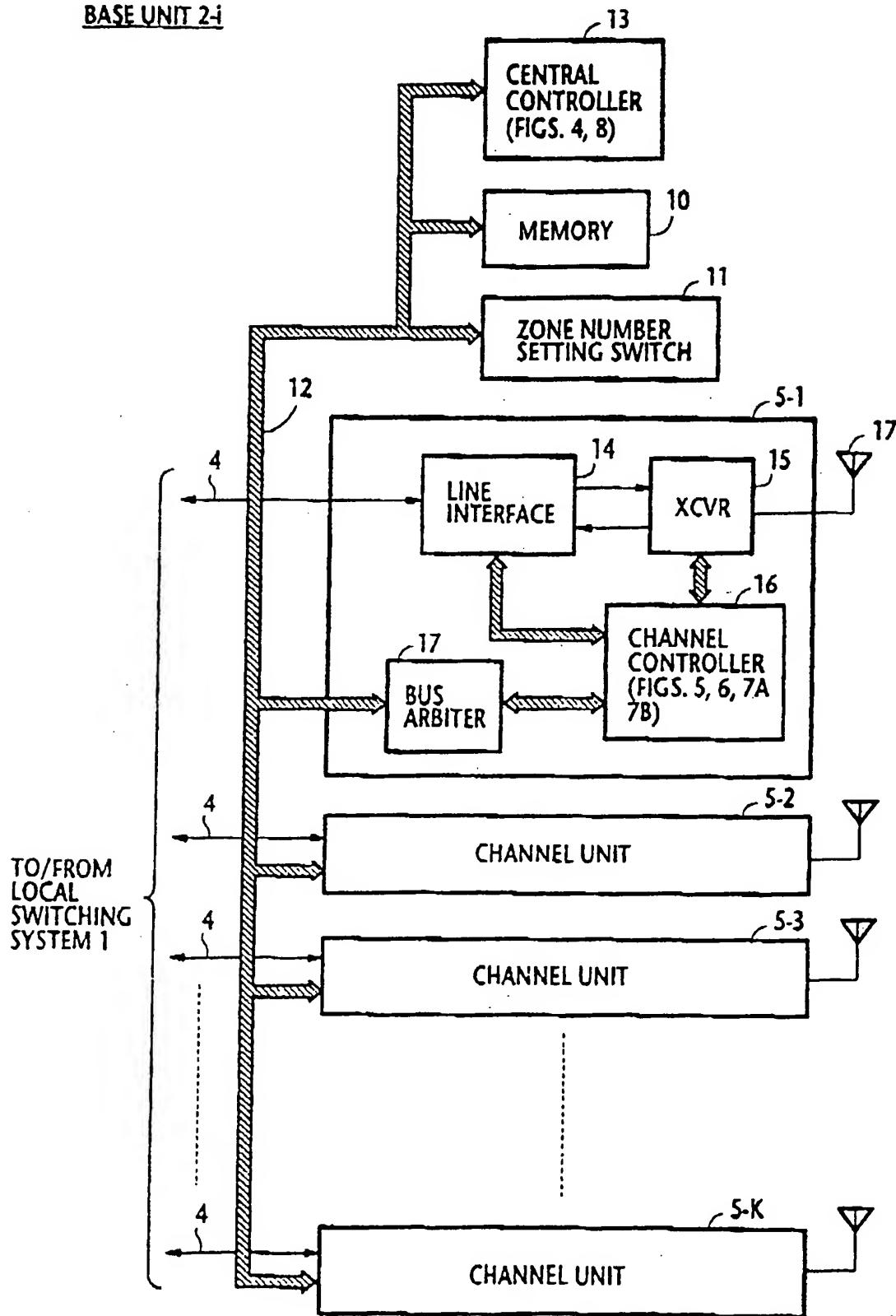


FIG. 1

FIG. 2

BASE UNIT 2-i



**FIG. 3**CHANNEL GROUP TABLE

GROUP NUMBER	SPEECH CHANNEL NUMBER
GROUP #1	#1, #2, #4, #8, #13, #21, #35
GROUP #2	#3, #5, #6, #10, #12, #20, #32
GROUP #3	#7, #9, #14, #15, #25, #29, #38
⋮	⋮

20

GROUP PRIORITY TABLE

GROUP NUMBER	PRIORITY
GROUP #1	0.5
GROUP #2	0.76
GROUP #3	0.64
⋮	⋮

21

CHANNEL STATUS TABLE

CHANNEL NUMBER	BUSY/IDLE
CHANNEL #1	1/0
CHANNEL #2	1/0
CHANNEL #3	1/0
⋮	⋮

22

FIELD INTENSITY TABLE

CHANNEL NUMBER	INTENSITY
CHANNEL #1	0/1/2*
CHANNEL #2	0/1/2
CHANNEL #3	0/1/2
⋮	⋮

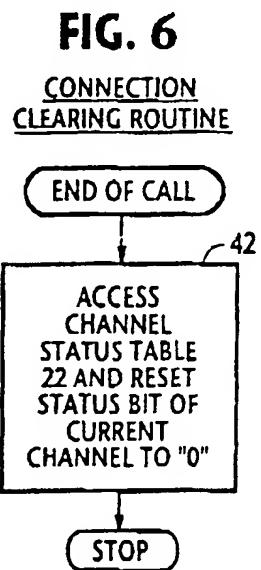
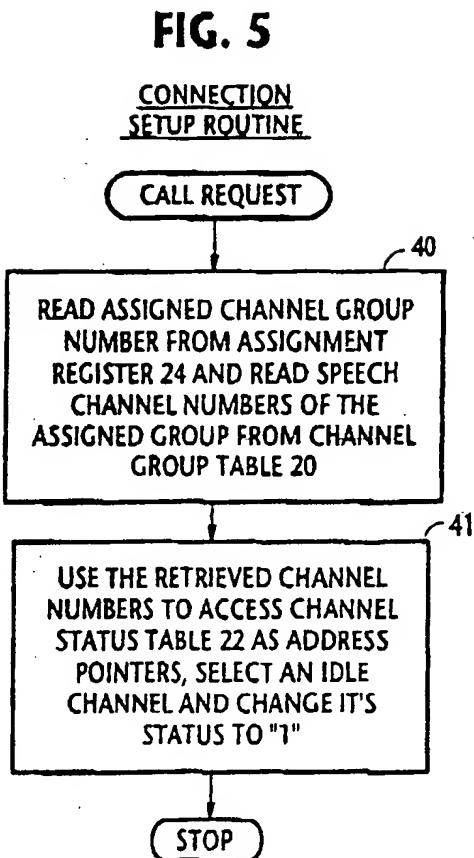
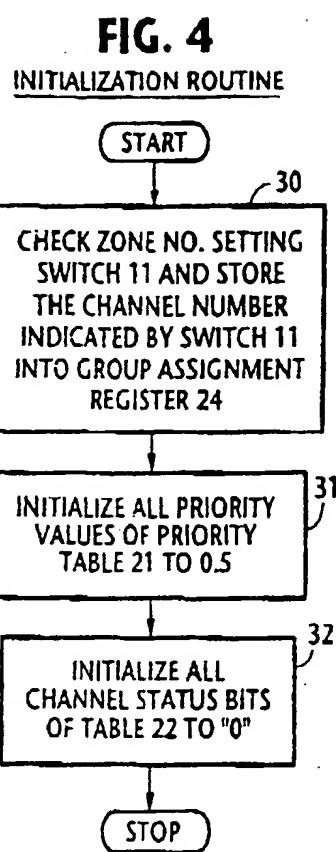
23

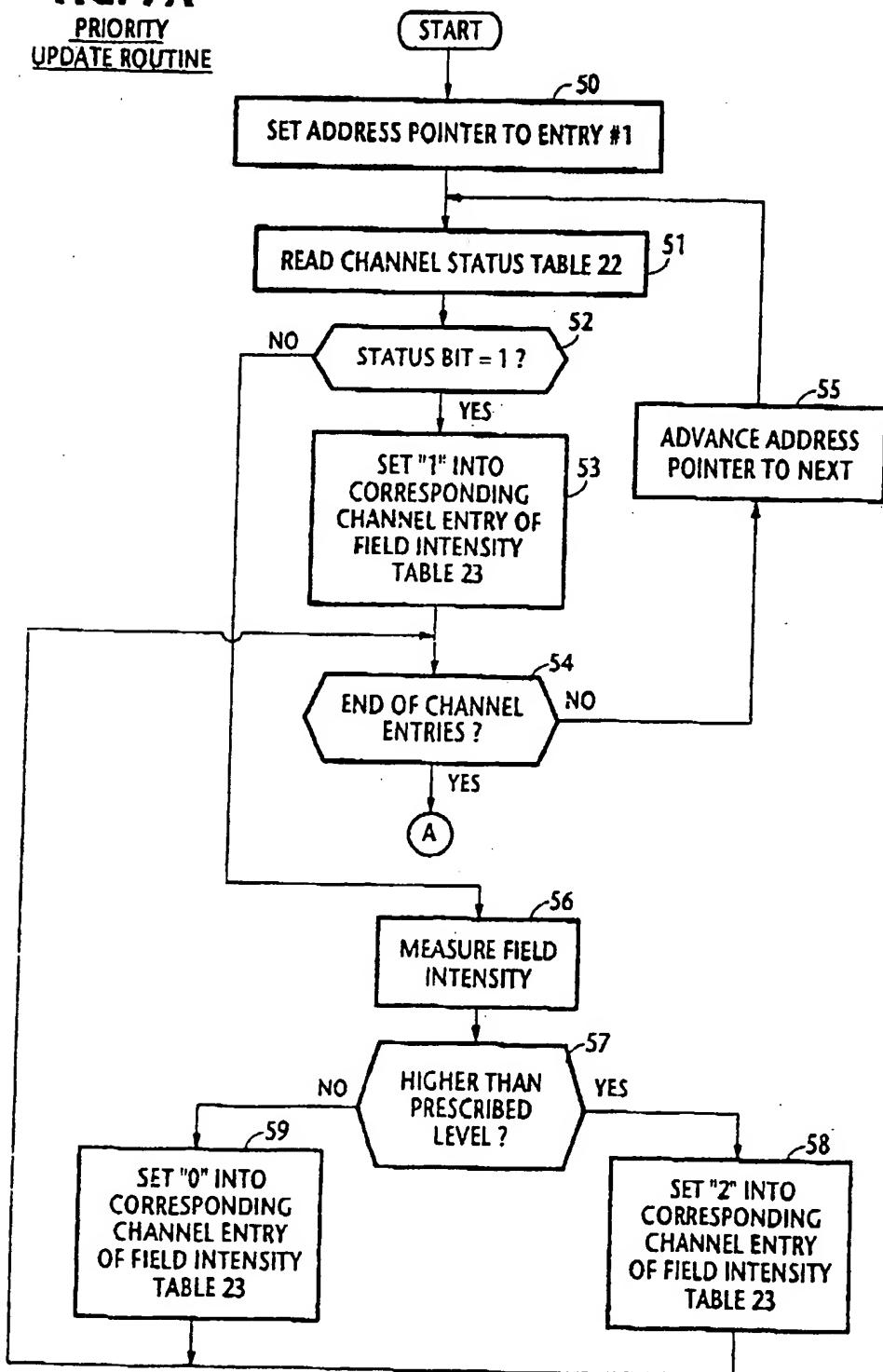
\* LEGEND:  
 0 = IDLE  
 1 = CHANNEL BUSY OF  
 ASSIGNED GROUP  
 2 = CHANNEL BUSY OF  
 NONASSIGNED GROUP

GROUP ASSIGNMENT REGISTER

24

ASSIGNED GROUP NO.



**FIG. 7A**PRIORITY  
UPDATE ROUTINE

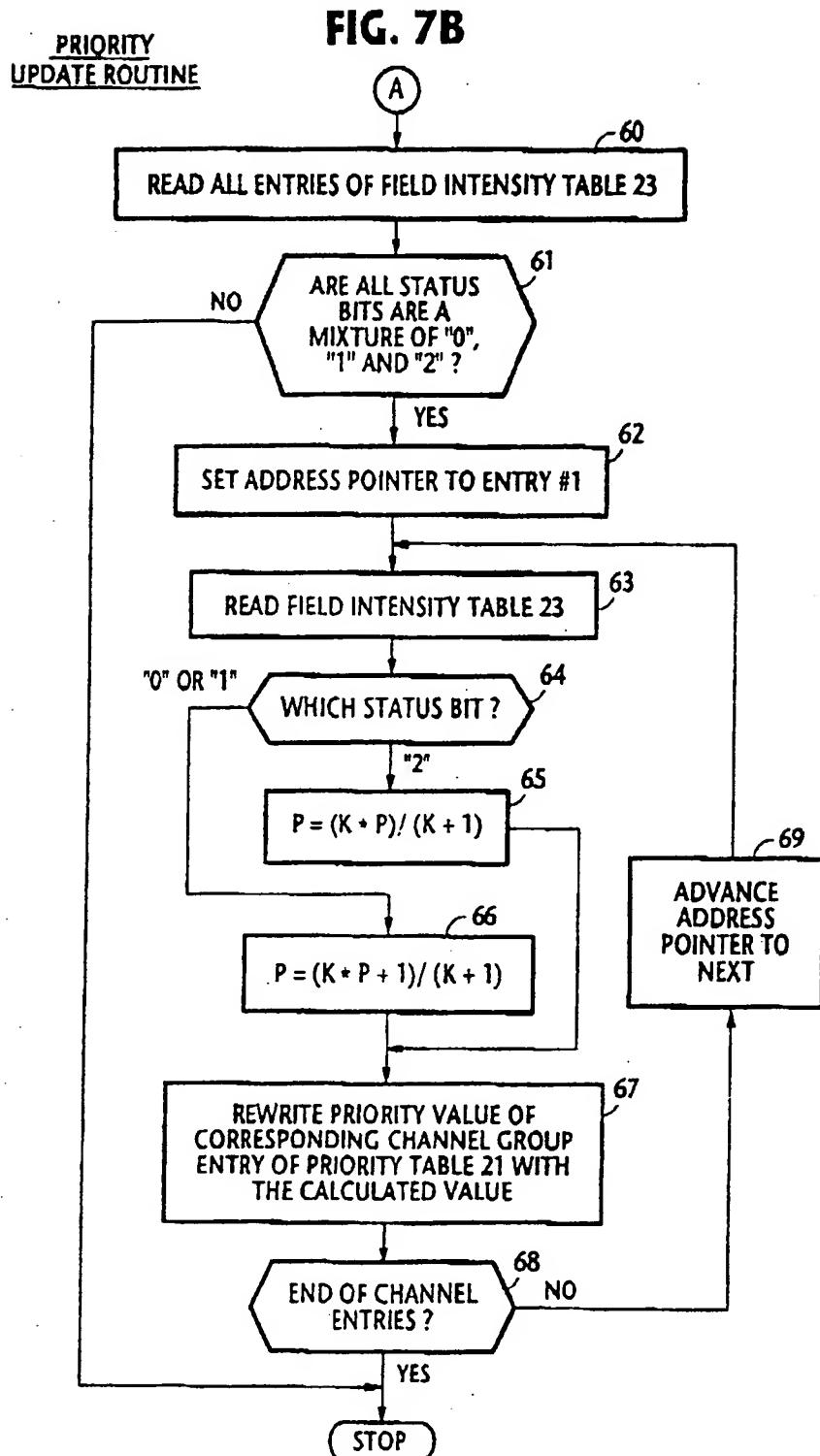


FIG. 8

CHANGE-OF-PRIORITY  
ROUTINE